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Leasing Conservation Products and Renewable Energy Technologies In the Residential Sector

Final Report

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Ministry
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Energy

Leasing Conservation Products and Renewable Energy Technologies In the Residential Sector

Final Report

Prepared for the Ontario Ministry of Energy
by *Watershed Energy Systems Inc.*

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Executive Summary

This study is an exploratory evaluation of the concept of renting or leasing energy conservation products and renewable technologies in the residential market.

The study investigates whether leasing these products and technologies may accelerate their acceptance, improve market penetration or be economically justifiable. The energy impact and employment benefits to Ontario arising from the introduction of select leasing programs are projected.

Three product areas are examined in detail, using the following specific products as examples:

Energy Efficient Appliances: Refrigerators

A lease or rental program to accelerate the replacement of refrigerators with an ultra-high efficiency product could be justifiable if the product were commercially available in Ontario. A changeover of 50% of the existing refrigerators to ultra-high efficiency could save approximately 2520 GWH of electricity annually.

Home Energy Tuneups / Small Conservation Products: Compact Fluorescent Lighting

Direct marketing of these products and services by a utility at little or no cost to the consumer appears justified because of their very high cost effectiveness. This could be achieved through a leasing or rental program since energy savings would exceed the lease or rental fee. Two utilities in the United States have indicated that the leasing approach for energy efficient light bulbs permits significantly higher market penetration than rebate programs.

HVAC and Water Heating Systems: Solar Water Heaters

Solar water heaters are now available that offer a significant increase in performance and reliability over those marketed in the early 1980's. After a rebate from Ontario Hydro, it may make sense to lease solar hot water heaters as monthly payments may be very close to energy savings. The annual energy savings through the installation of this product to 12.5% of the market are projected at 417 GWH.

Even for these three samples, the employment and energy benefits resulting from widespread market penetration are enormous. After ten years, energy savings total 3182 GWH for the province and over 3000 jobs are created, for the domestic market alone. Leasing or renting could greatly assist in this market penetration.

Introduction:

Different concepts have been explored for renting or leasing energy conservation and renewable energy technologies. In this study, the concepts of renting and leasing are used interchangeably. (see discussion of terms, appendix C)

Although to our knowledge leasing or rental programs are not widespread, several programs are in place that incorporate different forms of sales financing to assist the purchase or conservation equipment. These include:

Solar equipment rental programs now in place in Europe.

The rental or lease of compact fluorescent light bulbs.

The low interest ENERMARK program used by Hydro to encourage the purchase of heat pumps, insulation and other products.

Mortgage extension programs to finance solar equipment such as the HUD programs in the 80's in the USA. (These are being revived currently).

It appears that different financing routes may be appropriate for different forms of energy conservation and product types, depending on the price, payback and manner that similar products are marketed today.

For example, for appliances such as high efficiency refrigerators or washing machines, a program that involves the current retail network and includes a special lease financing and rebate package may be most appropriate.

Energy conservation programs that include home energy tuneups and small conservation products, such as light bulbs, shower heads, or water heater blankets achieve good penetration through door to door and direct marketing programs. Often these are implemented at little or no cost to the consumer, especially to low income groups. Some of these products, such as compact fluorescent bulbs, have been successfully marketed in leasing programs.

More expensive products, such as solar water heaters, or space heating heat pumps, could be marketed through a utility rental program similar to the current water heater rental programs now in place in Ontario. These are referred to here as HVAC (heating ventilating and air conditioning) and water heating systems.

The financing alternatives will be discussed individually under the following headings: Energy efficient appliances; Home Energy Tuneups and Small Conservation Products; and HVAC or Water Heating Systems.

Energy Efficient Appliances:

Appliances are available that provide significant savings over those in use and even those now being widely marketed by Ontario retailers.

Most significant among the appliances available are higher efficiency refrigerators and clothes washers. In addition, room air conditioners are currently produced in the United States that have much higher efficiencies than those produced in Ontario.

Some utilities in the United States and B.C. Hydro have initiated both labelling and rebate programs to influence the purchase of high efficiency models at the point of sale. In many cases, incentives are offered to both the buyer and the sales personnel. These programs have been effective in altering the buying decision in a large fraction of the new appliance market. Many utility programs involving rebates have concentrated on refrigerators.

Efforts have also been made to remove old inefficient product from the market, through programs that purchase old refrigerators. Examples include the program by B.C. Hydro and another by Wisconsin Electric. These have also been very effective.

Could a leasing or rental program further accelerate the replacement of the vast numbers of inefficient appliances? It is believed that this could be done through a rental program, providing the following conditions were met:

> The products are introduced at little or no additional cost to the consumer. (ie if energy savings equal lease payments).
>
> The old product is removed from the market at the same time. (ie a replacement is effected)
>
> The rental system does not bypass the current trades or retailing network.

With these factors in mind, the question of whether a leasing program could be helpful in encouraging the use of energy efficient appliances was investigated, be it through an accelerated replacement program or at the point of purchase of a new or used unit. Two examples are shown in the table on page 4.

Two types of refrigerators were considered as candidates for leasing: the high efficiency models now available (800 kWh/yr), and the ultra high performance dual loop fridges (300 kWh/yr), in use in Europe, but not yet widely available in North America.

For the models now available, leasing does not make sense for new purchasers, since the rebate programs have been shown to work quite effectively. The option of accelerated replacement of old inefficient models was also judged ineffective, since the energy savings were not high enough to cover the financing charges.

The ultra high efficiency dual loop refrigerator, however, offers a much better possibility for leasing. For these units, the energy savings may justify the lease payment costs. (see table overleaf for examples).

These are now manufactured in Europe. They use a dual loop technology (one compressor for the freezer and one for the fridge) and consume approximately 300 kWh per year, as compared to 800 kWh for the best models now on the market. They are not yet commercially available in Canada and the one US model, though efficient, is judged not to be of commerial-ready quality. If a commercial-ready refrigerator were produced of this type, it is quite possible that a rental or lease program could bring it into the range where wide scale replacement would be an economic consideration.

The economics would be further enhanced if an additional "environmental" rebate were offered in view of reduced CO_2 or acid gas emissions or reduced CFC's. This could take the form of a waiver of provincial sales tax or better still, a cash rebate over and above the utility rebate to reflect the benefits to society.

However the formula is arrived at, to achieve widespread market acceptance of a product replacement program, it has been recommended to us that the consumer see little or no additional net monthly cost. Furthermore, to ensure the cooperation of the manufacturers and appliance distribution industry, the program should not bypass the existing sales structure.

Refrigerator Leasing Economics

	Ultra High Efficiency Dual Loop Refrigerator (non-CFC) (300 kWh per year)		Typical High Efficiency Refrigerator available today (800 kWh per year)
Cost	$ 1400		$ 1000
Energy Saving	1200 kWh/yr		700 kWh/yr
Utility Rebate	$ 300		$ 175
Environmental Rebate	$ 150		$ 50
Customer Energy Savings per month (yr. 5)	$ 8.61 11.84 17.64	mo. 1 mo. 60 mo. 120	$ 5.02 6.91 10.29
Lease costs per month	$ 10.12		$ 8.25 (assuming $1000 cost)
Utility costs per kWh (over 10 years)	2.5 cents		2.5 cents

notes:

A lifecycle of 10 years was taken in view of an accelerated replacement scenario, since the average refrigerator lasts for 18 to 20 years. (utility costs exclude administrative overheads)

It is assumed that electric power rates (starting at 8 cents per kWh) will rise at 8 % per year.

Lease costs are based on 11 % financing, over the 10 year lifecycle. This rate of return is typical for utility water heater rentals and is close to the rate offered to utilities by some leasing companies.

The environmental rebate is based on an assumed incentive for reduced emissions.

The costs shown for the ultra-high efficiency refrigerator are hypothetical, since the product is not commercially available in Ontario.

Summary: Energy Efficient Appliances - Refrigerators

- *New purchases can be effectively influenced by rebate programs which encourage higher efficiency appliances.*

- *Removal of old inefficient product is important. Buy out programs can assist.*

- *If an accelerated replacement program is desired, because of the long life expectancy of refrigerators, a leasing/rental program may be a cost effective way to encourage the use of ultra high efficiency dual loop refrigerators, such as are now available in Europe. The energy savings from the best high efficiency models now available in Canada, are not sufficient to fully justify their monthly fees.*

- *Leasing or rental has the advantage over rebate programs in that both the higher capital costs and the technical risks of new technology can be removed. Since energy savings largely cover the monthly leasing fees, the costs to the customer are minimal and high market penetration may be possible. Furthermore, the customer is not faced with the uncertainty of a new technology, since any maintenance or repairs can be made the responsibility of the supplier.*

- *Such a leasing program might apply to either new purchases or to an accelerated replacement program. It could probably displace a significant part of the used appliance market for old refrigerators as well.*

- *Ultra high efficiency refrigerators may offer a significant business and employment opportunity in Ontario if a product were developed and manufactured here and sold through a lease or rental program.*

- *Refrigerators currently consume about 6300 GWH annually in Ontario. Savings of 80% are possible with a 100% replacement with ultra high efficiency refrigerators.*

Home Energy Tuneups and Small Conservation Products:

A home energy tuneup with conservation products, such as water tank insulation, energy efficient shower heads, or compact fluorescent lighting and others offers one of the most cost effective conservation steps available.

Unfortunately, in the absence of an aggressive direct marketing effort, involving little or no customer costs, this type of program remains the province of the energy conscious, upper income buyer and market penetration is limited.

This was confirmed in conversations with managers implementing demand side management in several other markets, including those in New Jersey, Massachusetts and Maine. Conversations with Ontario Hydro also confirm that the typical buyer of compact fluorescent light bulbs through the current rebate program is upper income, and about 55 years old.

If widespread implementation can be achieved, however, this conservation category can represent a significant saving in electrical consumption.

Two apparently successful programs in this area are the leasing programs for light bulbs in Burlington, Vermont and Taunton, Massachusetts. The program in Vermont was delivered door to door, sometimes by students. In Vermont, some conservation products were leased, such as the light bulbs, and some were installed at no charge.

Home tuneup programs are offered by many utilities, usually on a no charge basis (as in Vermont), or in connection with low interest loans for energy conservation retrofits (as by B.C. Hydro).

Typically, the simple home tuneup programs have included the following simple conservation components:

water heating: tank wrap
aerators
pipe insulation
shower heads

lighting savings: compact fluorescents

HVAC savings: air conditioner ductwork sealing and
air sealing and insulation
furnace tuneup & efficiency check

Such a retrofit program could be designed to introduce other programs such as leasing of high efficiency appliances or solar water heaters. Properly managed, it could also establish a customer information base for the implementation of future energy conservation initiatives. The home energy audit itself could be leased at a nominal charge, small enough that a utility could guarantee a net saving to the customer.

An example is given in the appendix, corresponding to the Vermont "Neighbor$ave" program. It cost about $130 to deliver (per customer) and saved the customer at least $5.00 per month in energy charges. Even delivered free, it was cost effective to the utility, at 1.7 cents per kWh. A nominal lease fee (say $1.00 or $2.00 per month) could be considered to assure customer interest and participation in the ongoing conservation measures.

Some form of door to door program could be readily introduced in Ontario to achieve a wide market penetration of conservation devices and services. In British Columbia, B.C. Hydro's Power Smart Home Improvement Program provides a free audit, followed by grants up to $1000 together with 5% loans up to $4000. Energy savings usually offset the cost of borrowing.

It appears that leasing programs in Massachusetts and Vermont have achieved very successful market penetration, for compact fluorescent light bulbs. A spokesman at Taunton Municipal felt that their penetration of 5% in the first year, using a low key residential leasing program far exceeded anything they could expect from a rebate program. For example, the Ontario Hydro light bulb rebate program sold about 70,000 bulbs in the first year. This represents 0.6% of the market potential. Using a leasing program and the guidelines from Taunton, one would expect to install about 600,000 bulbs per year.

The table on the following page presents an example of leasing a compact fluorescent light bulb. This example could apply to many products and services such as shower heads, energy audits, air sealing, and insulation.

Perhaps most important is that if such a channel existed for marketing conservation products, many future conservation or renewable product ideas could become available. Future conservation products might include kits for replacement of the furnace fan and motor, low cost occupancy sensors for room lighting, or simple energy monitors for heating systems or air conditioner performance.

Compact Fluorescent Light Bulbs: Leasing Economics

Cost	$ 20	
Energy Saving	45 kWh / yr.	
Utility Rebate	$ 5	
Customer Energy Savings per month (yr. 5)	$ 0.30	mo. 1
	0.44	mo. 60
	0.66	mo. 120
Lease costs per month	$ 0.21	
Utility costs per kWh (overhead not included)	1.1 cents	

notes:

The bulb life expectancy is 10 years, reflecting a life of 10,000 hours and 3 hours usage per day.

It is assumed that electric power rates (at 8 cents per kWh) will rise at 8 % per year.

Lease costs are based on 11 % financing a rate used typically by utilities as a rate of return and suggested as reasonable by Ontario Hydro.

Summary: Home Energy Tuneups and Small Conservation Products

- *Conservation products coupled with home energy tuneups offer major low cost energy savings.*

- *Small energy conservation products can be leased and pilot programs have indicated good market penetration.*

- *To achieve wide market penetration, these products are best delivered in a door to door or direct marketing program that includes personal customer contact.*

- *To achieve broad uptake of these products, program delivery should be at little or no cost to the customer. This could be achieved through a leasing or rental arrangement.*

HVAC and Water Heating Systems:

Some HVAC systems, such as space heating heat pumps are currently financed through the Ontario Hydro ENERMARK program. ENERMARK offers low interest loans and rebates to encourage the use of heat pumps in regions where natural gas is unavailable. These programs have proven to be very effective and in fact offer a form of sales financing similar to leasing.

Water heater rentals have been a major part of many municipal utility programs in Ontario since 1960. In addition to the conservation steps for water heating already outlined, an opportunity exists to extend this rental system to include solar water heaters.

Early solar water heaters (in the early 1980's) were not efficient and were plagued with maintenance problems. An Ontario Hydro test program of these early systems concluded that they were not a good utility option at that time. However, since 1983, the installed cost of solar water heaters has fallen by 50% and the performance and reliability have increased from a system average of 4-5 GJ/yr to 8-12 GJ/yr, and higher in some cases. In addition, increasing electric rates combine to make these systems more economic.

If systems were rented or leased by the utility, much of the consumer uncertainty about new technology, as well as resistance to capital expenditures might be overcome.

It is possible that after some rebate for avoided cost, the savings from solar water heating would equal or exceed the monthly leasing fee. This would provide economic justification for a utility installation program.

The program could be structured so that all systems installed would include a maintenance contract, provided to the utility by the installer.

A pilot program in the Netherlands has been set up whereby solar water heaters are rented by the utilities at a rate subsidized by the government. This was established as part of a larger 15 point program to reduce CO_2 emissions. In this program, the unit cost is subsidized 40% by the government and the solar water heaters are purchased by the gas utilities and then rented to customers. In general, the rental fee is the same with or without solar.

An estimate of the costs and performance of a solar water heater in a leasing scenario show excellent economics for this renewable energy measure. Customer savings very quickly outpace the leasing fee and the utility effective cost for energy is under 2 cents per kWh. Two examples are given below, for different system sizes.

It is interesting to note that a proportion of gas water heating customers may also want to take advantage of this kind of program and could be willing to pay the leasing fee for solar. Since they are also hydro customers, there is no reason other than the rebate, that an electric utility couldn't lease solar to gas water heating customers. As prices will certainly fall with volume use of these systems, this would extend the market for solar even further.

Solar Water Heating Leasing Economics

	Large Household		Smaller Household	
Load	6000 kWh /yr		4000 kWh /yr	
Installed Cost	$ 2500		$ 2000	
Saving	3333 kWh /yr		2200 kWh /yr	
Utility Rebate	$ 600		$ 600	
Costs per month	$ 23.43		$ 17.75	
Customer energy savings per month	$ 22.22	mo. 1	$ 14.67	mo. 1
	32.89	mo. 60	21.71	mo. 60
	48.99	mo. 120	32.34	mo. 120
Utility costs per kWh	1.2 cents		1.8 cents	

notes:

A conservative lifecycle of 15 years was taken for these systems, although a 20 year life is reported.

It is assumed that electric power rates (starting at 8 cents per kWh) will rise at 8 % per year. Lease costs are based on 11 % financing, over the 15 year lifecycle.

Maintenance is included in the monthly customer costs.

Summary: Solar Water Heating Systems

- *The leasing or rental of solar water heating systems appears to make economic sense, providing a utility rebate is offered in the range of $600. This appears to be in the range of the avoided costs offered by the product.*

- *Test programs are in the early stages in the Netherlands and in Vermont to assess the benefits of solar water heating from a leasing perspective.*

- *Since maintenance and repairs can be built in to the monthly customer costs, this removes a major barrier in uncertainty about new technology and further assists in market penetration.*

Potential Program Impact of Sample Leasing Programs:

On Energy Use in Ontario:

The table on the following page shows the impact that three leasing programs might have if they were to achieve wide market penetration. The assumption is made that a 5% market penetration is achieved per year, to a total of 50% after 10 years for the light bulbs and refrigerators and 1.25% per year for the solar water heaters, to a total of 12.5%.

Solar water heaters have lower penetration because a portion of the electric water heaters may be converted to gas and a further portion my not be accessible to solar, because of shading. A 50% penetration of the resulting available market is then considered. This estimate may be low if solar prices decline and gas customers start to use the program.

Three sample leasing programs were considered at an exploratory level, to estimate their impact. These include the refrigerator replacement program, solar water heating and a lighting program.

The projected energy impact for wide implementation is estimated at 245 GWH for the lighting program, 417 GWH for the solar water heaters and 2520 GWH for the refrigerators. The total energy savings from these three programs is projected at 3333 GWH annually.

One important factor in calculating customer benefits is the electric rate structure. At present, the low rates for higher consumption actually penalize conservation. Several utilities in the United States have already implemented new flat or reverse rate systems so that conservation is not discouraged by marginal rates. In this study, the customer benefits here have been calculated on the basis of an average residential consumer, for purposes of illustration.

It is important to note that this is only a sample of the potential for leasing programs. Future appliances and conservation measures could also be leased, such as better clothes washers, furnace fan replacement kits, occupancy sensors for lighting, solar space heating systems, low cost monitors for air conditioning, and many others. All these could have a major impact on energy and employment.

On Employment in Ontario:

There are two important components to the employment generated by these programs. The first is the direct employment produced by manufacturing and installing the products in Ontario. The second, and perhaps the more important, is the export potential of products and the resulting employment generated at this level. In this report, we have considered only the employment at the first level, for uses in Ontario.

If the programs are spread over ten years, the three programs are projected to create 6689 jobs, for the domestic market alone, together with $428 million in sales revenue annually.

Apart from an environmental rebate which is suggested for the non-CFC refrigerator, there are no extra costs or subsidies required at the government level. Through leasing or rental programs, conservation and renewables can compete on a fair commercial basis that offers these industries the opportunity for good growth and profitability.

Summary of Potential for Three Sample Leasing Programs

	market size (units)	percent market penetration after 10 yr	# of units installed after 10 yr	energy saved per unit KWH / yr	Total GWH saved per yr.	cost to implement per unit	years to implement	sales per year $ million	* number of jobs in Ontario
Refrigerator Accelerated Replacement Program	4,200,000	50.0%	2,100,000	1200	2520	$1,400	10	$294	2940
Compact Fluorescent Lighting Leasing	12,500,000	*** 50.0%	6,125,000	40	245	$20	10	$12	123
Solar Water Heating Leasing Program	1,000,000	** 12.5%	125,000	3333	417	$2,500	10	$31	313
					======= 3182 GWH per year energy saving			======= $338 million sales /yr	======= 3375 jobs (Ont. mkt only)

Notes:

* job calculations are based on one per $100,000 sales and Ontario market only. Jobs continue over a ten year period, ie 33440 man years of employment.

** market size considers electric water heaters only

*** market size considers 3.5 bulbs per household

Responses to the Leasing Concept:

From Ontario Hydro:

The response from Ontario Hydro staff has been positive. The utility is already evaluating a test leasing program for light bulbs with one of the municipal utilities, modelled largely on the experience of TMLP (Taunton Municipal Lighting Plant) in Massachusetts.

Ontario Hydro staff has also expressed some interest in the concept of the appliance leasing and is interested in considering a pilot program for solar water heaters. There seem to be no major impediments in Ontario Hydro's view, to test programs involving leasing or rental.

From Municipal Utilities:

The concept of leasing was presented to the energy management committee at a meeting at the Municipal Electric Association. Several points of concern were raised by the Municipal Utilities present:

> The mobility of the customers may pose a problem in collecting a long term lease. In Ottawa, one third of the customers move every year.
>
> Permanent fixtures, such as water heaters or heat pumps may be more appropriate to lease than smaller items such as refrigerators or light bulbs.
>
> Solar water heaters may not reduce the winter peak, so may be of limited use to the electric utilities.
>
> Products such as water heaters are useful to the utilities because they can be useful for load shifting. The other products do not have this property.
>
> The rate of return at 11% may be too low for leasing.
>
> Their billing systems in some cases are not equipped to handle leasing.
>
> The leasing concept may be a good idea for customers who are owners of condominiums or apartments, since they frequently supply these appliances to their tenants.
>
> What if the utility were to start leasing and the price were to drop, because of low cost imported products?

Conclusion:

It appears that leasing programs offer the potential to rapidly accelerate the use of energy conservation and renewable technologies in the residential sector.

Many alternatives are available for the structuring of leasing programs. Some municipal utilities have expressed concerns about administrative difficulties and in this regard, the different alternatives should be examined further to address these concerns and facilitate program implementation. Two different options for leasing programs are outlined in appendix C.

In reviewing programs now in place in North America, it is evident that market penetration is strongly enhanced by reducing up-front capital costs on the part of the customer. In addition, leasing or rental has the advantage of removing customer uncertainty about new technology, since maintenance and repairs can be built into the costs.

Perhaps the most attractive aspect of these programs for renewables or new conservation technology is that they are no longer the province of a government grant or subsidy program, but can compete in their own right in the commercial marketplace.

If widespread market penetration of conservation and renewable technologies is achieved, a major reduction in savings in electrical energy consumption appears possible. In addition, important employment benefits and export opportunities may emerge with the accelerated development of the industry. It appears that leasing or rental programs may assist in accelerating the penetration of these technologies.

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3. Friedlich Air Conditioning, Texas
4. W. C. Wood, Guelph, Ont.
5. Sunfrost, Arcata, California
6. B.C. Hydro, Vancouver, B.C.
7. Power Smart Inc., Vancouver, B.C.
8. Burlington Electric, Burlington, Vermont
9. Trans-Alta Utilities, Alberta
10. California Energy Commission
11. Solarworks, Vermont
12. Central Vermont Public Service Corporation, Vermont
13. SESCO Energy Service Company, New Jersey
14. Zonne Energie, Netherlands (Solar Manufacturer)
15. NOVEM, Utrecht, Netherlands
16. Municipal Electric Association, Demand Management Committee (Ontario)
17. Thermodynamics, Dartmouth, Nova Scotia (Solar mfg)
18. Ontario Hydro
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20. Pacific Gas and Electric, San Francisco, CA
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39. Taunton Municipal Lighting Plant, Taunton, Mass.

APPENDIX A

Synopses of Example Products

SYNOPSIS:

Dual Loop Refrigerator:

Product Cost (Retail): $1400
Annual Saving: 1200 kWh/yr
System Life: 10 yr.

Assuming:

Interest rate: 11%
Electric rates: 8 cents per kWh
increasing at 8% per year
Annual maintenance: nil
Utility rebate: $600

Cost to Utility of kWh saved: (lifetime kWh / rebate $)

assuming 18 yr. life: $ 0.021 per kWh

Monthly rental fee: $ 9.59

Monthly customer savings: month 12 9.68
month 60 13.32
month 120 19.84

The above calculations are predicated on an industry operating on a volume basis. It is assumed that an industry has been developed in Ontario to supply these dual loop refrigerators on a commercial basis, as is now done in Europe.

With 3.5 million households in Ontario, the potential energy savings at 120% saturation are 4200 GWH per year.

Using a distributed load of 120 W for a refrigerator, this would translate into a peak saving for the province of 202 MW.

SYNOPSIS:

Compact Fluorescent Light Bulbs: Economics

Installed Cost:	$20	
Annual savings:	45	kWh / yr.
Lifecycle:	10	years

Assuming:

Interest Rate:	11	%
Electric Rate:	8	cents / kWh
Annual Maintenance:	$0	/ yr.
Utility Rebate:	$5	

Cost to Utility of kWh saved (lifetime kWh /rebate $)

$0.011 per kWh

Monthly Rental Fee (incl. maintenance):

$0.21

Monthly customer savings:	month 12	$0.32
	month 60	$0.44
	month 120	$0.67

SYNOPSIS:

Solar Water Heating: (for medium to large user)

System Installed Cost: $2500
Annual Saving: 3333 kWh/yr
System Life: 15 yr.

Assuming:

Interest rate: 11%
Electric rates: 8 cents per kWh,
increasing at 8% per year
Annual maintenance: $22 per year
Utility rebate: $600

Cost to Utility of kWh saved: (lifetime kWh / rebate $)

assuming 15 yr. life:	$ 0.012 per kWh
assuming 20 yr. life:	$ 0.009 per kWh

Monthly rental fee (incl. maintenance): $ 23.43

Monthly customer savings:	month 12	23.90
	month 60	32.89
	month 120	48.99

The above calculations are predicated on an industry operating on a volume basis, with experienced installers.

The first installations would have extra costs and risks, since exact maintenance costs are not fully known. There are also the start up costs associated with advertising and developing the early market for the product and for training installers.

It is conceivable that a pilot program could include a component of government participation to absorb risks and start up costs. In this way, the balance of the program could be financed by the utility as though it were part of an ongoing rental program, operating on a commercial basis.

With 1 million electric water heaters in Ontario, and 50% solar accessibility, potential savings province wide are 1600 GWH per year.

APPENDIX B

Summary of
Residential Energy Conserving and Renewable Products

RESIDENTIAL ENERGY CONSERVING PRODUCTS, 1990

	Product Name	Cost	KWH / yr. Energy Consumption			comments
			before	after	change	
APPLIANCES						
001	High Efficiency Fridges (meeting DOE or better)	$900 to $1400	1500	800	700	not widely sold in Ontario now
002	Ultra High Efficiency Fridges (dual loop type)	$1400	1500	300	1200	product not available yet in Ontario
003	Chest Freezers					
004	Clothes Dryers		1200	780	420	heat pump type clothes dryers not yet available in Ontario
005	Clothes Washers	$600	850	250	600	horizontal axis type
006	Vaporizers	$100	700	100	600	cool mist type replaces steam
HOME TUNEUP / SMALL CONSERVATION PRODUCTS						
011	HVAC tuneup setback thermostat distribution system A/C coils and pressure fan, belt, filter	$150	20000	19000	1000	5% savings through "Total Tuneup" program as developed by HRAI
	furnace blower and motor replacement		1200	700	500	needs investigation
012	Water Heater Tuneup					
	low flow showerheads	$20			450	
	water heating blanket	$35			720	
	aerators	$ 3			55	
013	Home Envelope Tuneup insulation air sealing low E windows					
014	Lighting	$20			40	compact fluorescents: 10 yr.life
HVAC AND WATER HEATING SYSTEMS						
021	Space heating heat pumps					
022	Solar Water Heaters	$2500	6000	2700	3300	larger solar water heating load
023	Extended Solar Heating	$3500			4500	system has a space heating component as well as water heating
023	Room Air Conditioners		400	200	200	Canadian models inefficient

APPENDIX C

Notes on terms: LEASING and RENTAL
Sample Leasing Program from TMLP

Notes on terms: LEASING and RENTAL

The terms lease and rental are used interchangeably in this report, however some distinctions can be made.

A lease could be considered as offering the option of purchase after a time period of payments, whereas a rental item usually remains the property of the renter. It could be considered that since rental equipment remains the property of the renter, maintenance and repairs are bourne by the renter, whereas with a lease, the lessee would pay the repairs. However, this is not always the case.

In discussions with others, it was found that people use the terms interchangeably. For example, the programs in Taunton and Burlington, though appearing as rentals are called leases. Some US sources indicated that from a marketing point of view, people liked the word "lease" as implying a better status than the word "rental".

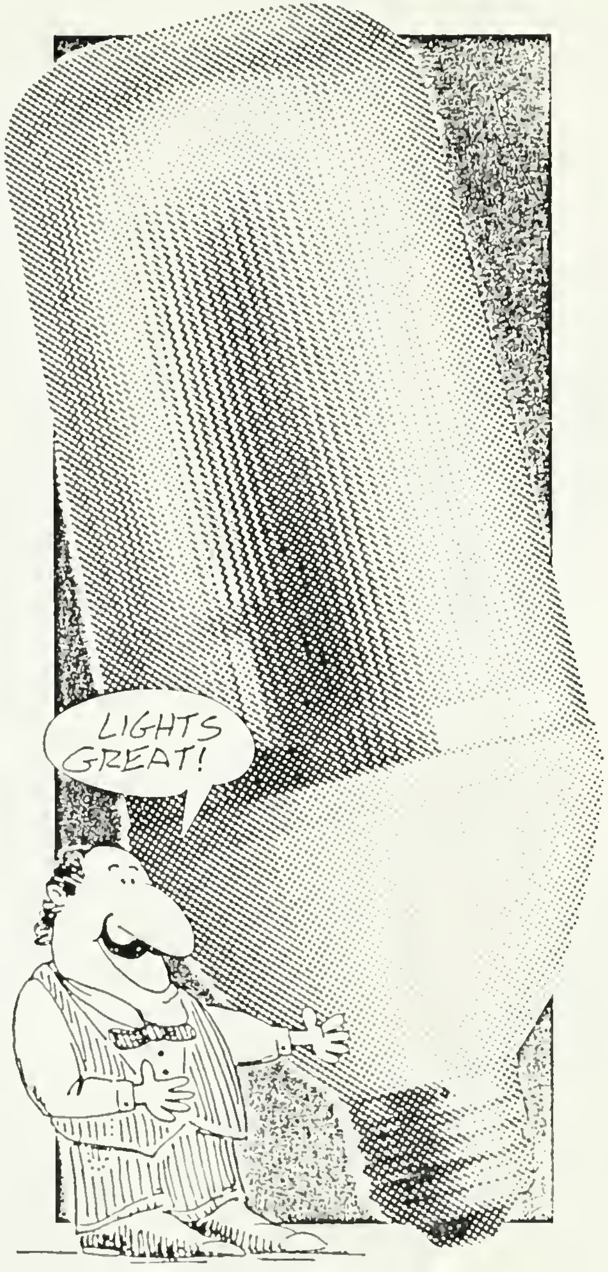
The programs used as examples here have taken the payment term to be the lifecycle of the equipment and in reality are more like rentals than leases. It is also thought that if maintenance and repairs are built into the cost and managed by the utility, then this would be of assistance in removing the customer resistance often associated with new technology.

In practise, these programs can be structured in any number of ways and the purpose here is to demonstrate the principle involved, rather than to recommend a specific approach.

TMLP

Taunton Municipal Lighting Plant
55 Weir Street Taunton, MA 02780-0870

TMLP SMART LIGHT


LIGHTS GREAT!

Guaranteed Savings

SMARTLIGHTS represent the latest advance in lighting technology. They use 80% less electricity and last ten times longer than ordinary lightbulbs!

Each SMARTLIGHT guarantees you'll save more than $50.00. And its super long life means you won't be changing lightbulbs all the time.

TMLP is leasing SMARTLIGHTS for only 20 cents a month. Should it ever burn out, TMLP will replace it, FREE!*

By using SMARTLIGHTS you save energy and money. In turn, TMLP doesn't have to supply expensive peak power. Combined, it works to keep rates down for everyone!

*[illegible]

What is a Smartlight?

A SMARTLIGHT is a miniature fluorescent bulb, folded into a compact shape and controlled by advanced electronics. It uses 18 watts to replace 75 watts, and still gives the same amount of light!

How long will it last?

Depending on how many hours it's used per day, a SMARTLIGHT will last from 1 to 6 years. You would need 10 standard bulbs to equal the life of a SMARTLIGHT.

How much will it cost?

SMARTLIGHTS can be leased for 20 cents each per month. Because it is a lease, TMLP will exchange your SMARTLIGHT free, should it need replacement. The monthly charge for SMARTLIGHTS appears on the electric bill.

Why lease a SMARTLIGHT?

Because of the advanced electronic technology and unique materials necessary to manufacture SMARTLIGHTS, they are expensive. In fact, if you were to purchase one it might cost $20 to $25.

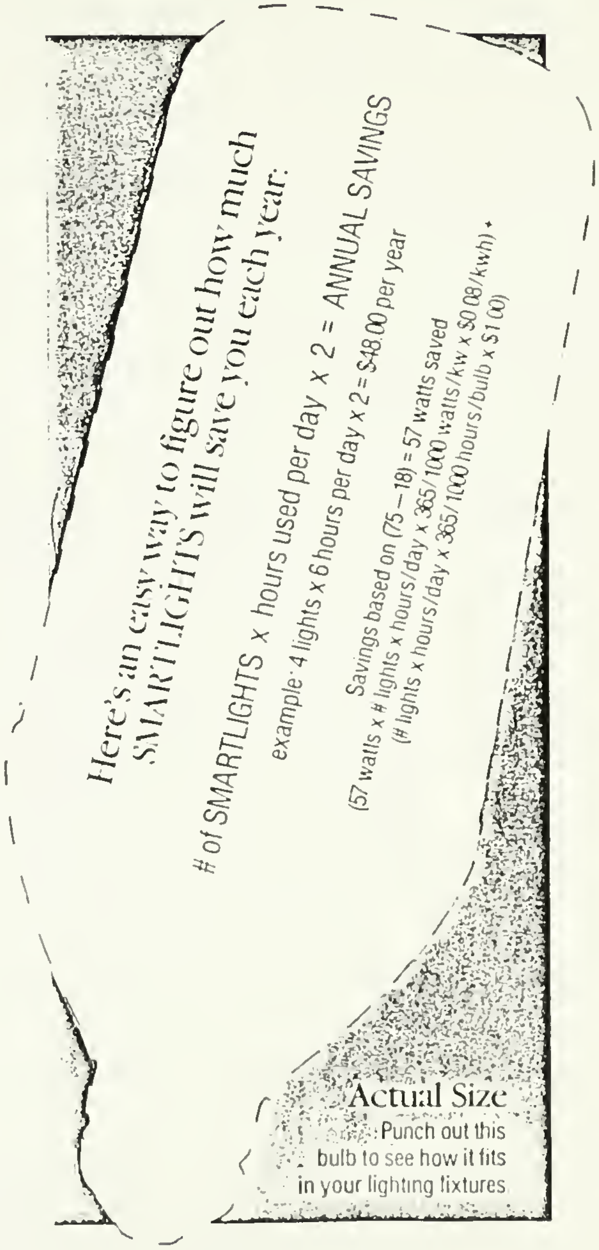
We know most people won't spend that much money for a bulb, even with a guaranteed $50 savings. So TMLP designed a way to make it easy to save.

TMLP purchases SMARTLIGHTS in bulk. We get a lower price and pass the savings to you. The cost of the light is recovered over time. That's why you only pay 20 cents a month.

How can I get a SMARTLIGHT?

Just fill out the attached card and drop it in the mail. TMLP will ship them directly to your home. If you prefer, stop by the main office at 55 Weir Street in Taunton and pick them up right away.

Calculate Your Annual Savings



Here's an easy way to figure out how much SMARTLIGHTS will save you each year:

# of SMARTLIGHTS x hours used per day x 2 = ANNUAL SAVINGS

example: 4 lights x 6 hours per day x 2 = $48.00 per year

Savings based on (75 – 18) = 57 watts saved

(57 watts x # lights x hours/day x 365/1000 watts/kw x $0.08/kwh) + (# lights x hours/day x 365/1000 hours/bulb x $1.00)

Actual Size

Punch out this bulb to see how it fits in your lighting fixtures.

Smartlight Lease Agreement

The lessee (customer) agrees to the following terms and conditions:

1. The lessee will be billed 20 cents per month for each SMARTLIGHT.
2. To receive replacement lights, the lessee must bring the SMARTLIGHT to TMLP's main office for exchange. TMLP will not replace broken or damaged lights resulting from accident, misuse or abuse, lack of reasonable care, the affixing of any attachment not provided with the product or subjecting the SMARTLIGHT to any but the specified electrical service.
3. Your rights may not be assigned or transferred.
4. When closing an account with a SMARTLIGHT Lease, the customer assumes responsibility for the balance due on the equipment. The customer must do one of the following:
   a. Return the SMARTLIGHTS to TMLP or
   b. Keep the SMARTLIGHTS and pay the balance.*
5. TMLP reserves the right to cancel the lease at any point in time. In such a case, the customer will NOT be responsible for any balance due, and may keep the equipment.
6. The SMARTLIGHT can NOT be used with a dimming switch. A dimming switch will cause the light to fail and void the lease.

What if I don't like it?

TMLP is confident you're going to love the way SMARTLIGHTS save money and energy. If for any reason you are not completely satisfied, just return the SMARTLIGHT to TMLP to terminate the lease.

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*The balance due shall be calculated as the total units leased multiplied by $13 less cumulative monthly lease payments for total units